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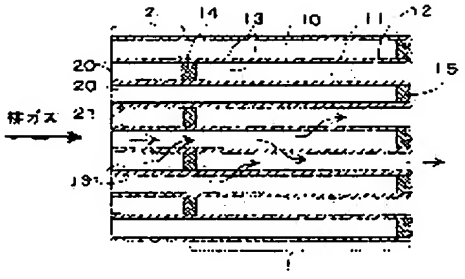
(54) EMISSION GAS PURIFICATION FILTER TYPE PROMOTER

(57)Abstract:
PROBLEM TO BE SOLVED: To suppress the piling of PM to an end face at the flow side of a DPF, and improve the purifying activity of PM.
SOLUTION: A straight flow honeycomb structure 2 at an upstream side is integrally formed at the exhaust gas upstream side of a wall flow honeycomb structure having a catalyst layer 13. PM is suppressed to be piled because an opening area of exhaust gas flow-in side end face is great. Thermal conductivity is improved and exhaust gas heat is smoothly conducted to the wall flow honeycomb structure 1 so as to raise the wall flow honeycomb structure 1 early and improve the activity of the catalyst layer 13.



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* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1]
It is the emission-gas-purification filter catalyst which purifies the exhaust gas containing the particulate discharged by the internal combustion engine,
The inflow side cel by which the weather strip was carried out by the exhaust gas downstream, and the outflow side cel by which adjoined this inflow side cel and the weather strip was carried out by the exhaust gas upstream, To the exhaust gas upstream of the Wall flow honeycomb structure section which consists of a filter septum which divides this inflow side cel and this outflow side cel, and a catalyst bed formed in the front face of this filter septum, and/or the front face of the pore of this filter septum The emission-gas-purification filter catalyst characterized by having the upstream straight flow honeycomb structure section which consists of an upstream straight cel in which exhaust gas flows in one direction, and an upstream cel septum which divides these upstream straight cels in this Wall flow honeycomb structure section and one.
[Claim 2]
The emission-gas-purification filter catalyst according to claim 1 by which the oxidation catalyst layer is formed in the front face of said upstream cel septum.
[Claim 3]
Said upstream straight cel is an emission-gas-purification filter catalyst according to claim 1 or 2 which has the ramp which counters the end face of said filter septum, is inclined and prolonged in the emission way from said upstream straight cel to said inflow side cel from said upstream cel septum, connects said upstream cel septum and said filter septum with it, and shows exhaust gas to said outflow side cel.
[Claim 4]
Said ramp is an emission-gas-purification filter catalyst according to claim 3 which is the weather-strip section of said outflow side cel formed of deformation of said filter septum.
[Claim 5]
It has further the downstream straight flow honeycomb structure section which becomes the exhaust gas downstream of said Wall flow honeycomb structure section from the downstream straight cel in which it is said Wall flow honeycomb structure section and one, and exhaust gas flows in one direction, and the downstream cel septum which divides these downstream straight cels, and is NOx in this downstream cel septum. Emission-gas-purification filter catalyst according to claim 1 to 4 in which the occlusion reduction catalyst layer is formed.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]
This invention relates to the emission-gas-purification filter catalyst which purifies the exhaust gas containing a particulate, such as exhaust gas from a diesel power plant.
[0002]
[Description of the Prior Art]
About the gasoline engine, the injurious ingredient in exhaust gas has been decreasing certainly by severe regulation of exhaust gas, and advance of the technique in which it can be coped with. However, about the diesel power plant, the advance of a technique is also behind also in regulation from the unique situation that an injurious ingredient is discharged as a particulate (particulate matter: sulfur system particles, such as a carbon particle and sulfate, the amount hydrocarbon particle of macromolecules, etc. are called following PM), compared with the gasoline engine.
[0003]
As an exhaust gas purge for diesel power plants currently developed by current, it roughly divides and the exhaust gas purge (Wall flow) of a trap mold and the exhaust gas purge (straight flow) of an open type are known. Among these, as an exhaust gas purge of a trap mold, the ****** type honeycomb object made from a ceramic (diesel PM filter (it is called Following DPF)) is known. Discharge controls by this DPF consisting of a filter septum which divides the inflow side cel by which comes to ****** the both ends of opening of the cel of a ceramic honeycomb structure object in checkers by turns, and the weather strip was carried out by the exhaust-gas downstream, the outflow side cel by which adjoined the inflow side cel and the weather strip was carried out by the exhaust-gas upstream, and an inflow side cel and an outflow side cel, filtering exhaust gas by the pore of a filter septum, and carrying out uptake of the PM.
[0004]
However, since a pressure loss goes up by deposition of PM, it is necessary to remove periodically PM deposited with a certain means, and to reproduce in DPF. Then, when a pressure loss goes up conventionally, reproducing DPF by burning PM deposited in the burner or the electric heater is performed. However, in this case, the temperature at the time of combustion rises, so that there is much alimentation of PM, and DPF may be damaged with the thermal stress by it.
[0005]
So, in recent years, a coat layer is formed in the front face of the filter septum of DPF from an alumina etc., and the continuation playback type DPF which supported catalyst metals, such as platinum (Pt), in the coat layer is developed. Since PM by which uptake was carried out carries out oxidation combustion by the catalytic reaction of a catalyst metal according to this continuation playback type DPF, DPF is reproducible by making it burn simultaneous in uptake succeeding uptake. And since catalytic reaction can burn while there are few being comparatively generated at low temperature and amounts of uptake, it has the advantage that the thermal stress which acts on DPF is small, and breakage is prevented.
[0006]
As such a continuation playback type DPF, the thing of a configuration of that, as for the porosity oxide with which an average pole diameter is 5-35 micrometers, and the porosity of a filter septum constitutes a coat layer from 40 - 65%, the thing of a particle size smaller than the average pole diameter of a filter septum occupies more than 90wt% is indicated by JP,9-220423,A. A coat layer can be formed even in the inner surface of not only the front face of a filter septum but pore by carrying out the coat of such a porosity oxide of high specific surface area. Moreover, since fixed, then coat thickness can be made thin for the

amount of coats, increase of a pressure loss can be controlled.
[0007]
Moreover, in JP,6-159037,A, it is NOx further to the above-mentioned coat layer. The continuation playback type DPF which supported occlusion material is indicated. It will be NOx if it does in this way. It is NOx to occlusion material. NOx by which occlusion was carried out by being able to carry out occlusion and spraying reducing agents, such as gas oil, It becomes possible to return and purify.
[0008]
[Problem(s) to be Solved by the Invention]
However, opening of an inflow side cel and the weather-strip section of an outflow side cel adjoin and exist in the inflow side edge side of DPF. Therefore, there is a fault of a numerical aperture being as small as 50% or less, and being easy to deposit PM and an ash on the weather-strip section etc. And NOx by which occlusion was carried out to the coat layer when the conditions that entering gas temperature is low continued When spraying of the reducing agent for returning continued, opening of an inflow side cel was blockaded by PM which the deposit grew and deposited even on opening of an inflow side cel from the weather-strip section, and there was a case where an engine output declined by back pressure rise. It is further easy to blockade in order that a liquefied particle may collide with an inflow side edge side directly, when especially reducing agents, such as gas oil, are sprayed.
[0009]
Moreover, in the continuation playback type DPF, the amount of coats is restrained from balance with a pressure loss, the amount of support of a catalyst metal cannot be made [many], but there is a problem that activity has constraint. It is because the support consistency of a catalyst metal will become large and endurance will fall with the grain growth at the time of an elevated temperature, if many catalyst metals are supported in a thin coat layer.
[0010]
It is possible to arrange the oxidation catalyst of a straight flow mold to the upstream of DPF as indicated by JP,9-032539,A there. If it does in this way, gas hydrocarbon (HC), carbon monoxide (CO), or liquefied fusibility organic component (SOF) will oxidize according to an oxidation catalyst, and NO is NO2. It becomes and is NOx. Since occlusion is carried out to occlusion material and exhaust gas temperature also rises, they are PM and NOx. The rate of purification improves. Moreover, since the reducing agent in DPF is gasified by the oxidation catalyst, a liquefied particle does not collide with the inflow side edge side of DPF directly. Therefore, opening lock out of the inflow side cel of DPF can be prevented.
[0011]
However, since most passes an oxidation catalyst as it is, deposition of PM in the inflow side edge side of DPF arises not a little, and PM cannot solve this problem fundamentally. Moreover, when the die length of casing has constraint, it is necessary to shorten the die length of an oxidation catalyst or DPF. However, the oxidation catalyst or DPF with short die length cannot secure precision with a group of casing, but has the problem that strong dependability is low.
[0012]
While this invention is made in view of such a situation and controlling deposition of PM in the inflow side edge side of DPF, it aims at raising purification activity further.
[0013]
[Means for Solving the Problem]
The description of the emission-gas-purification filter catalyst of this invention which solves the above-mentioned technical problem is an emission-gas-purification filter catalyst which purifies the exhaust gas containing PM discharged by the internal combustion engine,
The inflow side cel by which the weather strip was carried out by the exhaust gas downstream, and the outflow side cel by which adjoined the inflow side cel and the weather strip was carried out by the exhaust gas upstream, To the exhaust gas upstream of the Wall flow honeycomb structure section which consists of a filter septum which divides an inflow side cel and an outflow side cel, and a catalyst bed formed in the front face of a filter septum, and/or the front face of the pore of a filter septum It is in having the upstream straight flow honeycomb structure section which consists of an upstream straight cel in which exhaust gas flows in one direction, and an upstream cel septum which divides upstream straight cels in the Wall flow honeycomb structure section and one.
[0014]
It is desirable to form the oxidation catalyst layer in the front face of an upstream cel septum. Moreover, it is desirable to have the ramp which an upstream straight cel counters the end face of a filter septum, and is

inclined and prolonged in the emission way from an upstream straight cel to an inflow side cel from an upstream cel septum, connects an upstream cel septum and a filter septum with it, and shows exhaust gas to an outflow side cel, and, as for a ramp, it is desirable that it is the weather-strip section of the outflow side cel formed of deformation of a filter septum.

[0015]

And it has further the downstream straight flow honeycomb structure section which becomes the exhaust gas downstream of the Wall flow honeycomb structure section from the downstream straight cel in which it is the Wall flow honeycomb structure section and one, and exhaust gas flows in one direction, and the downstream cel septum which divides downstream straight cels, and is NOx in a downstream cel septum. It is desirable to form the occlusion reduction catalyst layer.

[0016]

[Embodiment of the Invention]

With the emission-gas-purification filter catalyst of this invention, it has the upstream straight flow honeycomb structure section in the exhaust gas upstream of the Wall flow honeycomb structure section at one. It will not be avoided that the Wall flow honeycomb structure section and the upstream straight flow honeycomb structure section arise [a clearance] among both in the thing of another object, but the heat of exhaust gas will escape from the part. However, in this invention, since the Wall flow honeycomb structure section and the upstream straight flow honeycomb structure section are one, thermal conductivity improves and the heat of exhaust gas gets across to the Wall flow honeycomb structure section smoothly. Therefore, the temperature up of the Wall flow honeycomb structure section is carried out at an early stage, and the activity of a catalyst bed is discovered at an early stage.

[0017]

Moreover, if an upstream straight cel and an inflow side cel are made in agreement in same axle for example, the exhaust gas which flows an upstream straight cel in one direction will flow into an inflow side cel as it is. Therefore, it is controlled that PM accumulates on opening of an inflow side cel, and increase of a pressure loss is controlled. Moreover, even if entering gas temperature falls and PM accumulates on an inflow side cel, by being one, PM deposited since the heat retaining property of the Wall flow honeycomb structure section was high can be burned, and lock out of opening of an inflow side cel can be prevented. In addition, although an upstream straight cel will also counter the weather-strip section of an outflow side cel and deposition of PM to that part is not avoided in this case, it is possible to burn PM deposited by circulating hot exhaust gas. And since heat retaining property is [that the temperature up of the Wall flow honeycomb structure section is easy to be carried out] high as described above, combustion of PM can also be performed easily.

[0018]

Furthermore, if the weather-strip section may be damaged by the time of handling, or vibration if the weather-strip section of the outflow side cel of the Wall flow honeycomb structure section has expressed to the end face, and it becomes so, since the exhaust gas which flowed from the breakage section is discharged from an outflow side cel as it is outside, it is difficult to remove PM. However, since the upstream straight flow honeycomb structure section is following the upstream of the Wall flow honeycomb structure section in this invention at one, the weather-strip section of an outflow side cel cannot express, and the fall of PM decontamination capacity by the breakage can be prevented certainly.

[0019]

As for an upstream straight cel, it is desirable to have the ramp which counters the end face of a filter septum, is inclined and prolonged in the emission way from an upstream straight cel to an inflow side cel from an upstream cel septum, connects an upstream cel septum and a filter septum with it, and shows exhaust gas to an outflow side cel. Thus, with constituting, it can show smoothly the exhaust gas which flowed into the upstream straight cel to an inflow side cel, and deposition of PM to the weather-strip section of an outflow side cel can be controlled.

[0020]

As for this ramp, it is desirable that it is the weather-strip section of the outflow side cel formed of deformation of a filter septum. If it is the weather-strip section formed of deformation of a filter septum, circulation of exhaust gas is possible and a ramp can also filter PM. And also although it is called the weather-strip section, the heat capacity of the ramp is small compared with the conventional weather-strip plug equivalent to a filter septum. Therefore, a temperature up property improves and the oxidation purification activity of PM deposited on a ramp improves.

[0021]

It is still more desirable to form the oxidation catalyst layer in the front face of an upstream cel septum. Oxidation purification of HC in the exhaust gas which flows an upstream straight cel in one direction by this, CO, etc. can be carried out, and the temperature up of the Wall flow honeycomb structure section is further promoted by the generation of heat. And it is NOx to the catalyst bed of the Wall flow honeycomb structure section. NO2 generated by oxidation in an oxidation catalyst layer when supporting occlusion material NOx Since occlusion can be carried out to occlusion material, it is NOx. Purification activity improves further. And it is NOx in the Wall flow honeycomb structure section since heat retaining property is [that a reducing agent evaporates in an upstream straight cel, it flows into the Wall flow honeycomb structure section and the temperature up of the Wall flow honeycomb structure section is moreover easy to be carried out] high when spraying reducing agents, such as gas oil. Reduction activity improves.

[0022]

The exhaust gas downstream of the Wall flow honeycomb structure section can also be further equipped with the downstream straight flow honeycomb structure section which consists of a downstream straight cel in which it is the Wall flow honeycomb structure section and one, and exhaust gas flows in one direction, and a downstream cel septum which divides downstream straight cels. In this case, in a downstream cel septum, it is NOx. It is desirable to form the occlusion reduction catalyst layer. When reducing agents, such as gas oil, are sprayed, the activity reforming HC which the reducing agent reacted and generated by the catalyst bed of the Wall flow honeycomb structure section flows into a downstream straight cel. Moreover, with the heat of reaction in a catalyst bed, the temperature of the exhaust gas which flows into a downstream straight cel rises further. Therefore, NOx NOx in an occlusion reduction catalyst layer Reduction activity improves. Moreover, in a downstream straight cel, it is NOx. Since a pressure loss does not increase so much even if it increases the quantity of an occlusion reduction catalyst bed, thereby, they are noble metals and NOx. The support consistency of occlusion material can be made low and endurance improves.

[0023]

The Wall flow honeycomb structure section, the upstream straight flow honeycomb structure section, or the downstream straight flow honeycomb structure section can be manufactured from heat-resistant ceramics, such as cordierite. And what is necessary is to form the structure of a straight honeycomb configuration by extrusion molding first, to give a weather strip to the location which went into the interior from the end side, to form an outflow side cel in it, to carry out a weather strip to the end face of the opposite side, to form an inflow side cel, and just to calcinate after that, in order to constitute both in one. Or the Green Plastic solid of a honeycomb structure object and a straight honeycomb structure object which carried out the weather strip can be calcinated in the condition of having compared mutually, to DPF, and it can also combine with it.

[0024]

The filter septum of the Wall flow honeycomb structure section has the desirable range whose porosity is 40 - 80% and whose average pole diameter is 10-40 micrometers, and it is desirable for porosity to be 60 - 75% and for an average pole diameter especially to be 22-35 micrometers at least. It is a catalyst bed while being able to carry out the uptake of the PM efficiently by this. Even if it carries out 100- 200 g/L formation, increase of a pressure loss can be controlled. In order to form pore in a filter septum, combustible powder, such as carbon powder, wood flour, starch, and a polymer, etc. is mixed in slurries used as a principal component, such as cordierite powder, and pore can be formed because combustible powder disappears at the time of baking. Moreover, in order to adjust the porosity and average pole diameter of a filter septum, it can carry out by adjusting the particle size and the amount of combustible powder.

[0025]

The catalyst bed formed in a filter septum comes to support a catalyst metal to a porosity oxide, and is a porosity oxide. The multiple oxide which consists of oxides, such as aluminum 2O3, and ZrO2, CeO2, TiO2, SiO2, or two or more of these sorts can be used.

[0026]

As for this catalyst bed, it is desirable to be formed not only in the front face of a filter septum but in the front face in the pore formed of disappearance of combustible powder.

[0027]

It considers as the catalyst bed currently formed in this filter septum, and the amount of coats of 100 - 200 g/L. the amount of coats less than 100 g/L -- NOx the fall of the endurance of occlusion ability is not avoided -- a pressure loss becomes high too much and is not practical if 200 g/L is exceeded.

[0028]

What is necessary is to make oxide powder or multiple oxide powder into a slurry with a binder component

and water, such as alumina sol, and just to calcinate, after making the slurry adhere to a filter septum in order to form a catalyst bed. Although dip coating usual to making a slurry adhere to a filter septum can be used, it is desirable to remove the extraneous article of a slurry which entered in pore by the air blow or suction.

[0029]

As a catalyst metal supported by the catalyst bed, it is NOx by catalytic reaction. Although it can use if it can return and oxidation of PM is promoted, it is desirable to support a kind chosen from the noble metals of platinum groups, such as Pt, Rh, and Pd, at least or two or more sorts. And it is NOx further. It is also desirable to support occlusion material. As for the amount of support of noble metals, it is desirable to consider as the range of per [2-8g] volume of 1l. of the Wall flow honeycomb structure section. It will become a cost rise while activity is saturated, even if activity will be too low, will not be practical and will support mostly from this range, if there are few amounts of support than this.

[0030]

Moreover, what is necessary is just to support using the solution which dissolved the nitrate of noble metals etc. in the coat layer which consists of oxide powder or multiple oxide powder by the adsorption supporting method, the water absorption supporting method, etc., in order to support noble metals. Moreover, noble metals are beforehand supported to oxide powder or multiple oxide powder, and a catalyst bed can also be formed using the catalyst powder.

[0031]

NOx supported by the catalyst bed As occlusion material, it can choose from rare earth elements, such as alkaline earth metal, such as alkali metal, such as K, Na, Cs, and Li, and Ba, calcium, Mg, Sr, or Sc, Y, Pr, Nd, and can use. It is NOx especially. The thing of the alkali metal which excelled in occlusion ability, and alkaline earth metal for which a kind is used at least is desirable.

[0032]

This NOx As for the amount of support of occlusion material, it is desirable to consider as the range of 0.25-0.45 mols per volume of 1l. of the Wall flow honeycomb structure section. If activity is too low and it is not practical, if there are few amounts of support than this, and it supports mostly from this range, noble metals will be covered and activity will come to fall.

[0033]

Moreover, NOx What is necessary is just to support in a coat layer by the water absorption supporting method etc. using the solution which dissolved acetate, a nitrate, etc., in order to support occlusion material. Moreover, it is NOx beforehand to oxide powder or multiple oxide powder. Occlusion material is supported and a catalyst bed can also be formed using the powder.

[0034]

The upstream straight flow honeycomb structure section and the downstream straight flow honeycomb structure section can be formed from heat-resistant ceramics, such as cordierite, like the Wall flow honeycomb structure section. In order to raise integrity with the Wall flow honeycomb structure section, it is desirable to consider as the Wall flow honeycomb structure section and this quality of the material.

[0035]

Although the upstream cel septum and downstream cel septum of the upstream straight flow honeycomb structure section and the downstream straight flow honeycomb structure section do not need to form pore since they do not have to carry out uptake of the PM, they may have the same pore distribution as a filter septum.

[0036]

The oxidation catalyst layer formed in the front face of an upstream cel septum comes to support noble metals to a porosity oxide at least, and is per volume of 1l. of the upstream straight flow honeycomb structure section. It is desirable to form in the range of 100-300g. As a porosity oxide The multiple oxide which consists of oxides, such as aluminum 2O3, and ZrO2, CeO2, TiO2, SiO2, or two or more of these sorts can be used. Moreover, although it can use as noble metals if oxidation reaction of PM is promoted, it is desirable to support a kind chosen from the noble metals of platinum groups, such as Pt, Rh, and Pd, at least or two or more sorts. The amount of support of noble metals is per volume of 1l. of the upstream straight flow honeycomb structure section. It is desirable to consider as the range of 0.1-10g. It will become a cost rise while activity is saturated, even if activity will be too low, will not be practical and will support mostly from this range, if there are few amounts of support than this. In addition, it is NOx further to an oxidation catalyst layer. It does not care about supporting occlusion material, either.

[0037]

NOx formed in the front face of a downstream cel septum An occlusion reduction catalyst bed is noble metals and NOx to a porosity oxide. It comes to support occlusion material and is per volume of 1l. of the upstream straight flow honeycomb structure section. It is desirable to form in the range of 200-300g. As a porosity oxide The multiple oxide which consists of oxides, such as aluminum 2O3, and ZrO2, CeO2, TiO2, SiO2, or two or more of these sorts can be used. In addition, noble metals and NOx Support of occlusion material can be performed like the case where a catalyst bed is formed in a filter septum.
[0038]
As noble metals, it is NOx. Although it can use if a reduction reaction is promoted, it is desirable to support a kind chosen from the noble metals of platinum groups, such as Pt, Rh, and Pd, at least or two or more sorts. The amount of support of noble metals is per volume of 1l. of the downstream straight flow honeycomb structure section. It is desirable to consider as the range of 0.1-10g. It will become a cost rise while activity is saturated, even if activity will be too low, will not be practical and will support mostly from this range, if there are few amounts of support than this.
[0039]
NOx NOx supported by the occlusion reduction catalyst bed As occlusion material, it can choose from rare earth elements, such as alkaline earth metal, such as alkali metal, such as K, Na, Cs, and Li, and Ba, calcium, Mg, Sr, or Sc, Y, Pr, Nd, and can use. It is NOx especially. The thing of the alkali metal which excelled in occlusion ability, and alkaline earth metal for which a kind is used at least is desirable.
[0040]
This NOx As for the amount of support of occlusion material, it is desirable to consider as the range of 0.25-0.45 mols per volume of 1l. of the downstream straight flow honeycomb structure section. If activity is too low and it is not practical, if there are few amounts of support than this, and it supports mostly from this range, noble metals will be covered and activity will come to fall.
[0041]
Although the number of cels of the upstream straight flow honeycomb structure section and the downstream straight flow honeycomb structure section may be the same as the number of cels of the Wall flow honeycomb structure section and may differ, it is more desirable than the number of cels of the Wall flow honeycomb structure section to make [many] it. By making [many] the number of cels, they are an oxidation catalyst layer or NOx. Surface area of an occlusion reduction catalyst bed can be enlarged, and activity improves. Moreover, since the support consistency of noble metals becomes low, grain growth of noble metals is controlled and endurance improves. Furthermore, even if it makes [many] the number of cels, since it is a straight flow, increase of a pressure loss is hardly produced.
[0042]
[Example]
Hereafter, an example explains this invention concretely.
[0043]
(Example 1)
The important section sectional view of the emission-gas-purification filter catalyst of this example is shown in drawing 1 . This emission-gas-purification filter catalyst consists of the Wall flow honeycomb structure section 1 and the upstream straight flow honeycomb structure section 2 formed in the exhaust gas upstream of the Wall flow honeycomb structure section 1 at one.
[0044]
The Wall flow honeycomb structure section 1 consists of a filter septum 12 which divides the inflow side cel 10 by which the weather strip was carried out by the exhaust gas downstream, the outflow side cel 11 by which adjoined the inflow side cel 10 and the weather strip was carried out by the exhaust gas upstream, and the inflow side cel 10 and the outflow side cel 11, and a catalyst bed 13 formed in the front face of the filter septum 12. Moreover, the upstream straight flow honeycomb structure section 2 consists of an upstream straight cel 20, an upstream cel septum 21 which divides upstream straight cel 20, and a catalyst bed 13.
[0045]
Hereafter, the manufacture approach of this emission-gas-purification filter is explained, and it replaces with detailed explanation of a configuration.
[0046]
Diameter 129mm, die length 160mm, volume of about 2100 cc, the number of cels 300 cels / inch2 The base material of a straight honeycomb configuration with a square cel was prepared. The porosity of a base material is 65% and an average pole diameter is 30 micrometers.
[0047]

Next, the paste of the shape of a cream which mixes the organic binder and water of the specified quantity to the powder of the cordierite presentation which consists of an alumina, talc, a kaolin, and a silica, and has the stable firmness in it is prepared. Using this paste, using the paste impregnation machine (dispenser) with the pipe of predetermined die length, the weather strip of the 1 every ** was carried out to the location into which it went 10mm from the upstream end face of a base material by turns, and the middle plug 14 was formed in it. On the other hand, in the downstream end face of a base material, the weather strip of the cel without the middle plug 14 was carried out, and the end-face plug 15 was formed. It calcinated at 1400 degrees C after that, and the inflow side cel 10 and the outflow side cel 11 were formed.
[0048]
then, the wash coat of the slurry which is mainly concerned with alumina powder is carried out -- 110 degree C -- after desiccation It calcinated at 450 degrees C and the coat layer was formed. A coat layer is per 1l. of base materials. 150g was formed and it was formed in the front face of all the filter septa 12 and all the upstream cel septa 21, and the front face of pore. Subsequently, Pt, Li, Ba, and K were supported by the sinking-in supporting method, respectively, and the catalyst bed 13 was formed in all coat layers. 2g and Li the amount of support per 1l. of base materials 0.2 mols and Ba 0.1 mols and K are 0.05 mols. [Pt]
[0049]
With the above-mentioned emission-gas-purification filter of this example, exhaust gas flows into upstream straight cel 20 all first. Therefore, since opening area is large, it is hard coming to generate deposition of PM in an upstream end face, and cel lock out stops being able to happen easily. Moreover, oxidation purification of the gas constituents, such as HC in exhaust gas and CO, is carried out by the catalyst bed 13 of the upstream straight cel 20.
[0050]
Subsequently, exhaust gas flows into the inflow side cel 10, passes the filter septum 12, and is discharged from the outflow side cel 11. Under the present circumstances, uptake of the PM in exhaust gas is carried out to the filter septum 12. Although the exhaust gas which flowed into the upstream straight cel 20 with the middle plug 14 passes the upstream cel septum 21 and flows into the inflow side cel 10, uptake of the PM is carried out to middle plug 14 front face and the upstream cel septum 21 in this case. And oxidation combustion of the PM by which uptake was carried out is carried out by Pt currently supported by the catalyst bed 13.
[0051]
Generation of heat of the oxidation reaction in the upstream straight flow honeycomb structure section 2 is conducted in the Wall flow honeycomb structure section 1 through exhaust gas and a cel septum, and the heat retaining property of the middle plug 14 and its temperature up nature of the Wall flow honeycomb structure section 1 improve. Therefore, combustion of PM deposited on the middle plug 14 and the upstream cel septum 21 is promoted, and lock out of the upstream straight cel 20 is prevented. Moreover, the oxidation activity of PM in the Wall flow honeycomb structure section 1 improves. In addition, with the emission-gas-purification filter of this example, in case an actual engine exhaust air system is equipped, PM deposited according to the temperature up is burned and an emission-gas-purification filter is reproduced, it is checked that the temperature of the location of the middle plug 14 becomes higher 50 degrees C or more than the temperature of the end face of the upstream straight flow honeycomb structure section 2.
[0052]
(Example 2)
It is the same configuration as an example 1 except having supported 5g [per volume of 1l. of the upstream straight flow honeycomb structure section 2] Pt to the catalyst bed 13 of the upstream straight flow honeycomb structure section 2, and having not supported Li, Ba, and K to it.
[0053]
In this example, the oxidation activity in the upstream straight flow honeycomb structure section 2 is improving greatly compared with an example 1. Therefore, the heat retaining property of the middle plug 14 and the temperature up nature of the Wall flow honeycomb structure section 1 improve further.
[0054]
(Example 3)
The front view of the inflow side edge side of the emission-gas-purification filter catalyst of this example is shown in drawing 2 , and the important section sectional view is shown in drawing 3 . This emission-gas-purification filter catalyst is the same configuration as an example 1 except having cut off the upstream cel septum 21 to the location of the middle plug 14 alternately.
[0055]

In this example, since the exhaust gas the temperature up was carried out [exhaust gas] by the reaction in the upstream straight flow honeycomb structure section 2 becomes easy to contact the front face of the middle plug 14 and the upstream of the middle plug 14 carries out opening greatly, deposition of PM on the front face of the middle plug 14 stops being able to happen further easily. Therefore, lock out of the upstream straight cel 20 can be controlled further.

[0056]

In addition, although the middle plug 14 is formed like an example 1 in this example, the middle plug 14 can also be formed by pushing in the upstream cel septum 21 and plugging up one cel like the below-mentioned example 5.

[0057]

(Example 4)

The important section sectional view of the emission-gas-purification filter catalyst of this example is shown in drawing 4 . This emission-gas-purification filter catalyst is the same configuration as an example 3 except having made the end face by the side of emission close [of the middle plug 14] into the taper configuration which inclines toward the adjoining inflow side cel 10.

[0058]

In this example, since the exhaust gas which collided with the middle plug 14 is guided in a taper side and becomes easy to flow to the inflow side cel 10, lock out of the upstream straight cel 20 can be controlled further, and a pressure loss can be reduced.

[0059]

(Example 5)

The important section front view of the inflow side edge side of the emission-gas-purification filter catalyst of this example is shown in drawing 5 , and the important section sectional view is shown in drawing 6 . This emission-gas-purification filter catalyst consists of the Wall flow honeycomb structure section 1 and the upstream straight flow honeycomb structure section 2 formed in the exhaust gas upstream of the Wall flow honeycomb structure section 1 at one like the example 1.

[0060]

The upstream straight cel 20 is open for free passage in [as the inflow side cel 10] same axle, and the path of the upstream straight cel 20 is larger than the inflow side cel 10. Moreover, the upstream straight cel 20 also counters the middle plug 14, and the middle plug 14 is formed from the filter septum 12 and the upstream cel septum 21, and this quality of the material, and is formed in the taper configuration which inclines toward the inflow side cel 10. Other configurations are the same as that of an example 1. In addition, the die length of the upstream straight flow honeycomb structure section 2 is 12mm, and is the die length of the Wall flow honeycomb structure section 1. It is 138mm.

[0061]

It is a diameter as shown in the powder of the cordierite presentation which consists of an alumina, talc, a kaolin, and a silica at drawing 7 using the paste which mixed the organic binder, the water, and the carbon powder of the specified quantity. 130mm, die length 150mm, the number of cels 300 cels / inch2 The Green base material 3 of a straight honeycomb configuration with the square cel 30 was formed by extrusion molding.

[0062]

On the other hand, the press fixture 4 shown in drawing 7 was prepared. Nothing and two or more needles 41 can heat the shape of Mt. Tsurugi which this press fixture 4 becomes from the heater section 40 and two or more needles 41 which project from the heater section 40 by the heater section 40. Moreover, two or more needles 41 are constituted from the straight section 42 with a die length of 12mm and the point 43 of a pyramid configuration with a height of 3mm formed at the tip of the straight section 42 by the cross-section square, and the die length of the base of the one side and point 43 of the cross section of the straight section 42 serves as the twice as many root of one side of cel opening of the Green base material 3 as this.

[0063]

And where two or more needles 41 are heated by the heater section 40, as shown in drawing 7 , it inserted a depth of 15mm into the cel of the Green base material 3. The emission close side of the cel of the Green base material 3 deformed by this, and the upstream straight cel 20 and the middle plug 14 of a major diameter were formed by calcinating this. In addition, the porosity of the formed base material is 60%, and an average pole diameter is 30 micrometers. While forming the end-face plug 15 like the example 1 after that, the catalyst bed 13 was formed, and the emission-gas-purification filter catalyst of this example shown in drawing 6 was manufactured.

[0064]
With the emission-gas-purification filter catalyst of this example, since the resistance to the exhaust gas at the time of flowing into the inflow side cel 10 with the middle plug 14 of a taper configuration is small, pressure loss can be controlled. Moreover, the middle plug 14 is porosity in which gas transparency is possible like the filter septum 12, and since the volume is also small, the temperature up of the heat capacity is carried out at an early stage small, and it can control deposition of PM to the middle plug 14 further.
[0065]
(Example 6)
The important section sectional view of the emission-gas-purification filter catalyst of this example is shown in drawing 8 . This emission-gas-purification filter catalyst is the same configuration as an example 6 except there being [a path of the upstream straight cel 20] many those numbers small.
[0066]
In order to manufacture this emission-gas-purification filter catalyst, the Green base material without the upstream straight cel 20 of the Wall flow honeycomb structure section 1 is formed by setting the immersion depth to 3mm using the same fixture as an example 5. On the other hand, the Green base material which serves as the upstream straight flow honeycomb structure section 2 by extrusion molding is formed. And it calcinates, after sticking both base materials by pressure and joining, and the end-face plug 15 and a catalyst bed 13 are formed like an example 1 after that.
[0067]
With the emission-gas-purification filter catalyst of this example, since the surface area of the upstream straight flow honeycomb structure section 2 is large compared with an example 5, the reaction in the upstream straight flow honeycomb structure section 2 increases, and the temperature up nature of the Wall flow honeycomb structure section 1 improves with the heat of reaction. Therefore, the oxidation engine performance of PM improves further.
[0068]
(Example 7)
The important section sectional view of the emission-gas-purification filter catalyst of this example is shown in drawing 9 . This emission-gas-purification filter catalyst is further equipped with the downstream straight flow honeycomb structure section 5 which becomes the downstream of the Wall flow honeycomb structure section 1 from the downstream straight cel 50 and the downstream cel septum 51 which divides downstream straight cel 50.
[0069]
The catalyst bed 16 which comes to support Pt aluminum 2O3 and CeO2 to the filter septum 12 and the upstream cel septum 21 of the Wall flow honeycomb structure section 1 and the upstream straight flow honeycomb structure section 2 150 g/L formation is carried out and the catalyst bed 52 which comes to support Pt aluminum 2O3, and TiO2, ZrO2 and CeO2 to the downstream cel septum 51 of the downstream straight flow honeycomb structure section 5 270 g/L formation is carried out. Furthermore in the catalyst beds 16 and 52 of the filter septum 12 and the downstream cel septum 51, it is NOx of Li, Ba, and K. Occlusion material is supported. the amount of support of Pt -- respectively -- 2 g/L -- it is -- Li 0.2 mols / L and Ba 0.1 mols / L and K -- 0.05mol/L -- it is supported, respectively.
[0070]
In order to manufacture this emission-gas-purification filter catalyst, the press fixture 4 is pressed like an example 6 from the both-ends side of the Green base material which forms the Wall flow honeycomb structure section 1, and the Green base material which serves as the upstream straight flow honeycomb structure section 2 and the downstream straight flow honeycomb structure section 5 after that is joined and calcinated. To then, the filter septum 12 and the upstream cel septum 21, the middle plug 14, and the end-face plug 15 The coat layer which consists of aluminum 2O3 and CeO2 is formed, and it is to the downstream cel septum 51. aluminum 2O3 and the coat layer which consists of TiO2, ZrO2, and CeO2 are formed, respectively. And it is NOx to the coat layer which supports Pt in all coat layers and is formed subsequently to the filter septum 12 and the downstream cel septum 51. Occlusion material is supported.
[0071]
the emission-gas-purification filter catalyst of this example -- the upstream straight flow honeycomb structure section 2 -- setting -- HC and CO -- and -- oxidation purification of the SOF is carried out and PM carries out oxidation purification in the Wall flow honeycomb structure section 1 -- having -- and the downstream straight flow honeycomb structure section 5 -- setting -- NOx Occlusion reduction is carried out.

[0072]
Moreover, the middle plug 14 can penetrate gas, and since the thickness is not so thick, either, heat capacity is small [the plug]. Therefore, it supplies into exhaust gas especially by using the high-boiling points HC, such as gas oil, as a reducing agent, and is NOx. In returning, with the heat of reaction in the upstream straight flow honeycomb structure section 2, the temperature of the Wall flow honeycomb structure section 1 rises, and the oxidation activity of PM improves. moreover, it generated -- high -- NOx [in / since activity HC flows into the downstream straight flow honeycomb structure section 5 / the downstream straight flow honeycomb structure section 5] Reduction activity improves. And by enlarging surface area of the downstream straight flow honeycomb structure section 5, it is NOx. The endurance of the purification engine performance also improves.
[0073]
[Effect of the Invention]
That is, according to the emission-gas-purification filter catalyst of this invention, deposition of PM in an inflow side edge side is controlled, and increase of a pressure loss is controlled. Moreover, since it excels in the temperature up nature of the Wall flow honeycomb structure section, the oxidation activity of PM also improves. Furthermore, since opening area is large, it can make the diameter of a cel small, and the upstream straight flow honeycomb structure section can enlarge surface area. In this case, since a touch area with exhaust gas increases, while activity improves, since the support consistency of noble metals becomes low, the grain growth at the time of an elevated temperature is controlled, and endurance improves.
[Brief Description of the Drawings]
[Drawing 1] It is the important section sectional view of the emission-gas-purification filter catalyst of one example of this invention.
[Drawing 2] It is the front view of the emission close side edge side of the emission-gas-purification filter catalyst of the 3rd example of this invention.
[Drawing 3] It is the important section sectional view of the emission-gas-purification filter catalyst of the 3rd example of this invention.
[Drawing 4] It is the important section sectional view of the emission-gas-purification filter catalyst of the 4th example of this invention.
[Drawing 5] It is the important section front view of the emission close side edge side of the emission-gas-purification filter catalyst of the 5th example of this invention.
[Drawing 6] It is the important section sectional view of the emission-gas-purification filter catalyst of the 5th example of this invention.
[Drawing 7] It is the explanatory view showing how to manufacture the emission-gas-purification filter catalyst of the 5th example of this invention.
[Drawing 8] It is the important section sectional view of the emission-gas-purification filter catalyst of the 6th example of this invention.
[Drawing 9] It is the important section sectional view of the emission-gas-purification filter catalyst of the 7th example of this invention.
[Description of Notations]
1: Wall flow honeycomb structure section 2: Upstream straight flow honeycomb structure section
10: Inflow side cel 11: Outflow side cel 12: Filter septum
13: Catalyst bed 14: Middle plug 15: End-face plug
20: Upstream straight cel 21: Upstream cel septum

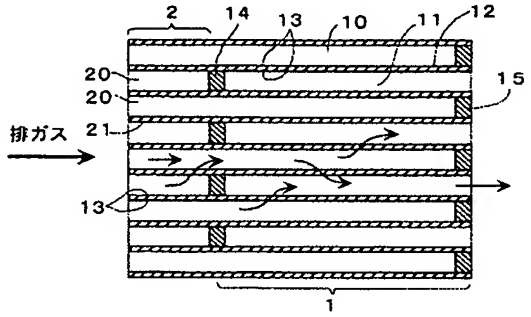
[Translation done.]

* NOTICES *

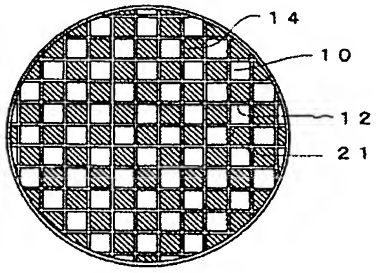
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

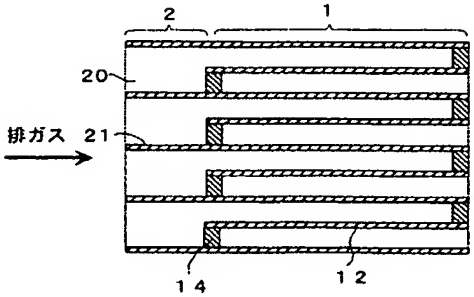
[Drawing 1]



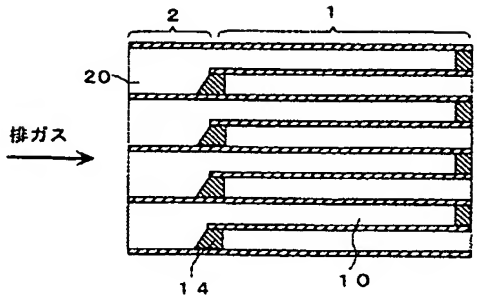
[Drawing 2]



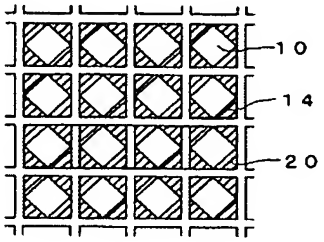
[Drawing 3]



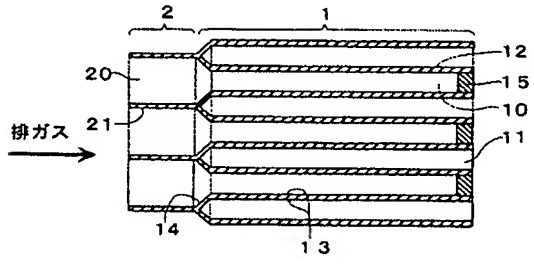
[Drawing 4]



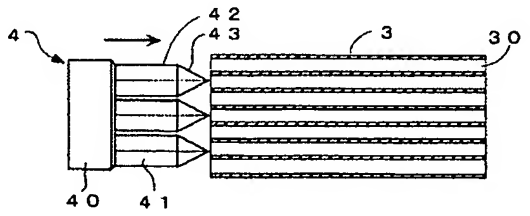
[Drawing 5]



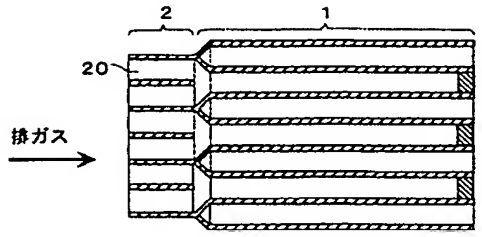
[Drawing 6]



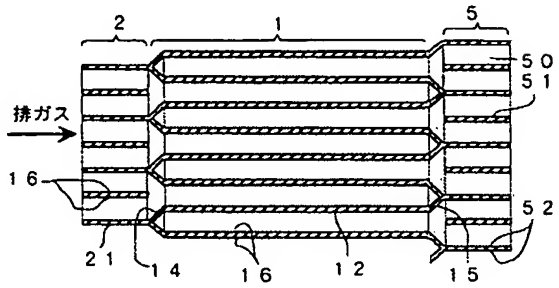
[Drawing 7]



[Drawing 8]



[Drawing 9]



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WRITTEN AMENDMENT

[Procedure revision]
[Filing Date] June 12, Heisei 15 (2003. 6.12)
[Procedure amendment 1]
[Document to be Amended] Specification
[Item(s) to be Amended] Claim
[Method of Amendment] Modification
[The contents of amendment]
[Claim(s)]
[Claim 1]
It is the emission-gas-purification filter catalyst which purifies the exhaust gas containing the particulate discharged by the internal combustion engine,
The inflow side cel by which the weather strip was carried out by the exhaust gas downstream, and the outflow side cel by which adjoined this inflow side cel and the weather strip was carried out by the exhaust gas upstream, To the exhaust gas upstream of the Wall flow honeycomb structure section which consists of a filter septum which divides this inflow side cel and this outflow side cel, and a catalyst bed formed in the front face of this filter septum, and/or the front face of the pore of this filter septum The emission-gas-purification filter catalyst characterized by having the upstream straight flow honeycomb structure section which consists of an upstream straight cel in which exhaust gas flows in one direction, and an upstream cel septum which divides these upstream straight cels in this Wall flow honeycomb structure section and one.
[Claim 2]
The emission-gas-purification filter catalyst according to claim 1 by which the oxidation catalyst layer is formed in the front face of said upstream cel septum.
[Claim 3]
Said upstream straight cel is an emission-gas-purification filter catalyst according to claim 1 or 2 which has the ramp which counters the end face of said filter septum, is inclined and prolonged in the emission way from said upstream straight cel to said inflow side cel from said upstream cel septum, connects said upstream cel septum and said filter septum with it, and shows exhaust gas to said inflow side cel.
[Claim 4]
Said ramp is an emission-gas-purification filter catalyst according to claim 3 which is the weather-strip section of said outflow side cel formed of deformation of said filter septum.
[Claim 5]
It has further the downstream straight flow honeycomb structure section which becomes the exhaust gas downstream of said Wall flow honeycomb structure section from the downstream straight cel in which it is said Wall flow honeycomb structure section and one, and exhaust gas flows in one direction, and the downstream cel septum which divides these downstream straight cels, and is NOx in this downstream cel septum. Emission-gas-purification filter catalyst according to claim 1 to 4 in which the occlusion reduction catalyst layer is formed.
[Procedure amendment 2]
[Document to be Amended] Specification
[Item(s) to be Amended] 0014
[Method of Amendment] Modification
[The contents of amendment]
[0014]
It is desirable to form the oxidation catalyst layer in the front face of an upstream cel septum. Moreover, it is

desirable to have the ramp which an upstream straight cel counters the end face of a filter septum, and is inclined and prolonged in the emission way from an upstream straight cel to an inflow side cel from an upstream cel septum, connects an upstream cel septum and a filter septum with it, and shows exhaust gas to an inflow side cel, and, as for a ramp, it is desirable that it is the weather-strip section of the outflow side cel formed of deformation of a filter septum.
[Procedure amendment 3]
[Document to be Amended] Specification
[Item(s) to be Amended] 0019
[Method of Amendment] Modification
[The contents of amendment]
[0019]
As for an upstream straight cel, it is desirable to have the ramp which counters the end face of a filter septum, is inclined and prolonged in the emission way from an upstream straight cel to an inflow side cel from an upstream cel septum, connects an upstream cel septum and a filter septum with it, and shows exhaust gas to an inflow side cel. Thus, with constituting, it can show smoothly the exhaust gas which flowed into the upstream straight cel to an inflow side cel, and deposition of PM to the weather-strip section of an outflow side cel can be controlled.

[Translation done.]